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Insect Control
7/11 annual Studies.

1913.

Insect Control Studies.

Species of Insects Killing Yellow and Sugar Pine.

The tables below show that from 84.5% to 97.9% of yellow pines are killed by bark beetles of the genus *Dendroctonus*. It also shows that the *Melanophila* sp. (flat-heads), *Ips confusus* and *Ips emarginatus* sometimes kill mature trees. The records of the species associated with the species killing, are necessarily very incomplete, as the spotter very often could not get back to the tree, after it was cut, to make an examination of the top. I have made a careful examination of many trees on control projects, and with few exceptions, beetles of the genus *Ips* are found in the top part of the trunk.

Many species belonging to the Buprestidae, or flat-heads, Scolytidae or bark beetles, and Cerambycidae or round-heads are found in every tree, following up the original attack of the *Dendroctonus*. These may be on the trunk, limbs, cones, twigs, needles or roots.

Trinity National Forest.

(Hayfork Project)

No. of trees treated - yellow pine	792
No. " " " - sugar pine	27

Species of insect causing death, - yellow pine.

Dendroctonus brevicomis-----	400	trees
Den. brevicomis and Den. valens-----	212	"
" " " Melanophila sp.-----	8	"
" " " Den. monticolae-----	4	"
" " " Ips sp.-----	4	"
" " D. monticolae & D. valens-----	3	"
" " D. " & Melanophila sp.-	1	"
" " D. valens & Ips. sp.-----	3	"
" " D. " & Melanophila sp.-----	8	"
" " Ips sp. & Melanophila sp.-----	<u>1</u>	"
Total killed by D. brevicomis-----	644	"
Dendroctonus valens-----	7	"
Den. valens & Melanophila sp.-----	3	"
" " & Den. brevicomis-----	2	"
" " Den. monticolae & Ips sp.-----	<u>1</u>	"
Total killed by D. valens-----	13	"
Dendroctonus monticolae-----	8	"
Den. monticolae and Melanophila sp.-----	4	"
" " " D. valens-----	<u>1</u>	"
Total killed by Den. monticolae-----	13	"
Ips confusus-----	8	"
" " & Melanophila sp.-----	<u>1</u>	"
	9	"
Melanophila sp.-----	88	"
" " & Den. valens-----	9	"
" " Den. valens & Ips sp.-----	2	"
" " " " D. brevicomis -----	2	"
" " & Den. monticolae-----	<u>3</u>	"
Total killed by Melanophila sp.-----	104	"

Spotter could not determine cause of death of 9 trees.

Summary:

Dendroctonus brevicomis-----	644	trees	or	81.3%
" valens-----	13	"	"	1.6%
" monticolae-----	13	"	"	1.6%
Ips confusus-----	9	"	"	1.1%
Melanophila sp.-----	104	"	"	13.2%
Unknown-----	9	"	"	1.2%
Total -----	792	"	"	100%

Species of insects causing death - sugar pine.

Dendroctonus monticolae-----	22	trees
Den. monticolae & valens-----	4	"
Melanophila gentilis (12"tree)-----	.1	"
Total -----	27	"

NOTE: Average diameter of these sugar pines was 39"

There seems to be considerable relation between species killing yellow pines and the diameter of the tree. Therefore with relation to these species I have divided the 792 trees into three diameter classes, 4" to 12" inclusive, 14" to 20" and over 20".

Den brevicomis 4" to 12"-----	143	trees
" " 14" to 20"-----	114	"
" " over 20"-----	387	"
Total -----	644	"

Den. valens 4" to 12"-----	2	"
" " 14" to 20"-----	1	"
" " over 20"-----	10	"
Total -----	13	"

Den. monticolae 4" to 12" -----	10	"
" " 14" to 20" -----	2	"
" " over 20" -----	1	"
Total -----	13	"

Melanophila sp.	4" to 12" -----	87	trees
"	" 14" to 20" -----	9	"
"	" over 20" -----	8	"
	Total-----	104	"

Ips confusus	4" to 12" -----	9	"
"	" 14 to 20" -----	0	"
"	" over 20" -----	0	"
	Total -----	9	"

From the above diameter classes may be deduced the following:

Dendroctonus species will attack all classes of trees, but show a preference except in the case of Den. monticolae for yellow pine trees over 20" in diameter.

Melanophila species or flathead borers under normal conditions ~~probably~~ will not kill trees over 20" in diameter, and Ips confusus most certainly does not. The result of one project is not conclusive proof. It should be followed up during the next two years.

California National Forest.

(Goodyear Project).

No. of trees treated - yellow pine- 236
 " " " " - sugar pine - 68

Species of insects causing death - yellow pine.

Dendroctonus brevicomis -----	156	trees
Den brevicomis & D. valens -----	35	"
" " " D. monticolae -----	5	"
" " " Ips confusus -----	2	"
" " " Ips emarginatus -----	1	"
Total killed by D. brevicomis	199	"

Den. monticolae	-----	19	trees
"	" & D. valens	9	"
"	" Ips emarginatus	3	"
Total killed by D. monticolae		31	"

Dendroctonus valens (48")	-----	1	"
Melanophila sp. (30")	-----	1	"
Ips emarginatus (10"-24"-38")	-----	3	"
Undetermined	-----	1	"

Summary:

Yellow pines killed by D. brevicomis	199	or	84.3%
" " " " D. monticolae	31	or	13.6%
" " " " D. valens	1		
" " " " Ips emarginatus	3		
" " " " Melanophila sp	1		
Cause of death not determined	1	or	2.1%

Species of insects causing death - sugar pine.

Den. monticolae	-----	61	trees
"	" & valens	7	"
Total killed by D. monticolae		68	"

Klamath National Forest.

(Craggy Project).

No. of trees treated - yellow pine	171
" " " " - sugar pine	7

Species of insects causing death - yellow pine.

Dendroctonus brevicomis	-----	140	trees
Den. brevicomis & Melanophila sp.	-----	7	"
" " " Den. monticolae	-----	2	"
Total killed by D. brevicomis		149	"
Dendroctonus monticolae	-----	6	"
Den. monticolae and D. brevicomis	-----	2	"
" " " Melanophila sp.	-----	7	"
Total killed by D. monticolae		15	"

Melanophila sp.-----	3 trees
" " & D. brevicomis -----	1 "
" " " D. monticolae -----	1 "
Total killed by Melanophila sp.-----	5 "
Cause of death not determined -----	2 "

Summary:

Yellow pine killed by D. brevicomis-----	149 or 87.2%
" " " " D. monticolae-----	15 or 8.8%
" " " " Melanophila sp.-----	5 or 2.9%
Cause of death not determined -----	2 or 1.1%

Species of insects causing death - sugar pine.

Dendroctonus monticolae -----	7 trees
(all 20" and over")	

Total killed by D. monticolae -----	7 trees
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SUMMARY.

Hayfork Project	792 yellow pines -	27 sugar pines
Goodyear "	236 " "	68 " "
Craggy (secondary work)	171 " "	7 " "
Total trees cut	1199 " "	102 " "

Killed by:

Den. brevicomis -----	992 yellow pines -	0 sugar pines
Den. monticolae-----	59 " "	-101 " "
Den. valens -----	14 " "	0 " "
Melanophila sp.(flathead)----	110 " "	0 " "
Ips. confusus -----	9 " "	0 " "
Ips emarginatus-----	3 " "	0 " "
Cause not determined-----	12 " "	0 " "
Melanophila gentilis-----	0 " "	1 " "
	1199 trees	102 trees

Ips confusus, however, killed over 1000 trees in the Sierra Forest (on the Contour Project) out of a total of 1942 trees cut. *These trees were all under 20"*

Percentage - yellow pine.

Dendroctonus brevicomis	-----	82.7%
" monticolae	-----	4.9
" valens	-----	1.2
Melanophila sp.	-----	9.2
Ips confusus	-----	.7
" emarginatus	-----	.3
Unknown	-----	1.0

Hopping.